

**Amendment**

Applicant: Robert Nason Thomas

Serial No.: 10/056,946

Filed: January 25, 2002

Docket No.: V255.101.101

Title: COUPLED VORTEX VERTICAL AXIS WIND TRUBINE

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**REMARKS**

Claims 1-20 are pending. By this Amendment, claim 1 is amended, and new claims 14-20 are added.

Applicant acknowledges, with appreciation, the courtesy extended Applicant's representative during the February 12, 2004 personal interview. During the interview, it was indicated that one example of a basis for the feature of a lift-based wind turbine is found in U.S. Patent No. 4,115, 027, which is incorporated by reference into the specification. Distinctions over the prior art also were discussed. Applicant's separate record of the substance of the interview is further incorporated in the following remarks.

Attention is directed to the concurrently filed Information Disclosure Statement, which cites the American Wind Energy Association document about vertical-axis wind turbines and an Intermediate Technology Development Group technical brief discussed during the personal interview.

**35 U.S.C. §§ 112 Issues**

Claims 1-13 stand rejected under 35 U.S.C. §§ 112, first paragraph, as failing to comply with the written description requirement. The examiner indicated that the use of the term "lift-developing blade with an airfoil-shaped cross-section" was not supported by the specification as originally filed.

As discussed during the personal interview on February 12, 2004, the specification, as originally filed, incorporated by reference U.S. Patent Number 4,115,027. This patent, which is incorporated by reference into the present application, contains a description in Column 4, lines

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3-10 of lift-developing blades with an airfoil-shaped cross-section. The airfoil-shaped blades are illustrated as elements 16, 17, 18, and 19 in Figure 1 and one of the blades is shown in detail in Figure 3 of U.S. Patent Number 4,115,027. Furthermore, the blades in the present application, as originally filed, were clearly shown in Figures 4 and 5 to have an airfoil-shaped cross-section. Moreover, it is understood by those of ordinary skill in the art that vertical axis wind turbines can be either lift-based or drag-based. The cited documents from the American Wind Energy Association and the Intermediate Technology Development Group demonstrate the distinction between lift-based and drag-based vertical axis wind turbines.

Applicant respectfully submits that anyone of ordinary skill in the art, when looking at Figures 4 and 5 of the present application in light of U.S. Patent Number 4,115,027 and the American Wind Energy Association and the Intermediate Technology Development Group documents, would recognize that the present invention is a “lift-based” vertical axis wind turbine as now claimed. Therefore, applicant respectfully submits that the language used in the claims, as amended herein, is supported by the specification.

**35 U.S.C. §§ 102 and 103 Issues**

The previous Office Action rejected claims 1-5 and 13 under 35 U.S.C. § 102(b) over Pohl (U.S. Patent No. 4,156,580), claims 6-7 under 35 U.S.C. § 103(a) over Pohl in view of Wells (U.S. Patent No. 4,221,538), claims 8-11 under 35 U.S.C. § 103(a) over Pohl in view of Tackett (U.S. Patent No. 4,118,637), and claim 12 under 35 U.S.C. § 103(a) over Pohl in view of Brammeier (U.S. Patent No. 5,495,128). Applicant respectfully traverses these rejections.

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Claims 1-5 and 13 stand rejected under 35 U.S.C. § 102(b) over Pohl (U.S. Patent No. 4,156,580). Pohl discloses a pair of wind turbines that operate on the principal of differential drag. This is in contradistinction to the present invention which claims a pair of “lift-based” wind turbines. The references cited along with this amendment, and discussed during the personal interview on February 12, 2004, make it clear that lift-based and drag-based vertical axis wind turbines are not analogous and that they operate on different aerodynamic principles. The Pohl patent makes this distinction in Column 1, Lines 1-25. Furthermore, the Pohl device does not include the claimed feature that “aerodynamic interaction between said wind turbines increases the efficiency thereof.” Pohl also does not teach or suggest generally unobstructed flow of wind between the wind turbines, as recited in new dependent claim 14 and new independent claim 15. Rather Pohl uses a wind-deflecting shield (element 7 in Figure 1) to concentrate the wind from a large capture area to a relatively small area in which the wind acts upon the drag surfaces. The Pohl device does not utilize any aerodynamic interaction between adjacent rotors. In Column 7, Lines 6-10, Pohl discusses the desirability of placing adjacent rotors so that they do not interfere aerodynamically with each other. The most recent Office Action states that “the feature of aerodynamic interaction between the wind turbines increasing the system efficiency is inherent to Pohl’s disclosed structure.” However, applicant respectfully disagrees with this position. Nothing in the Pohl reference discusses aerodynamic interaction between the rotors (in fact Pohl directly teaches away from this feature), and there is no reason to believe that the structure taught would provide increased efficiency through aerodynamic interaction. The two rotors shown in the Pohl patent are placed in close proximity to each other simply for the purpose of achieving a “very compact and robust” unit that lowers stresses and

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provides material and weight savings. Pohl discusses this design aspect in Column 1, Lines 32-38.

While lift-based vertical axis wind turbines are known in the prior art, there is nothing in the prior art to teach or suggest close placement of two adjacent lift-based vertical axis wind turbines so that aerodynamic interaction between said wind turbines increases the efficiency thereof as claimed.

For the foregoing reasons, applicant submits that the device presented in Claim 1 is different from the drag-based wind turbine described by Pohl. Furthermore, since Pohl relies upon an aerodynamic fairing to achieve high efficiency and a compact mechanical design, it would not have been obvious to one of ordinary skill in the art to have modified the Pohl device as set forth in the claims of the present invention.

Applicant submits that claims 2-5 and 13 are patentable for the same reasons as those set forth above in relation to claim 1.

Claims 6-7 stand rejected under 35 U.S.C. § 103(a) over Pohl in view of Wells (U.S. Patent No. 4,221,538). Applicant respectfully submits that these claims are patentable for the same reasons as those set forth above in relation to claim 1. The device taught by Wells is a single wind turbine rotor similar to those used on horizontal axis turbines, but turned on its side. The Wells reference does not mention aerodynamic interaction between two lift-based vertical axis wind turbines. There would be no way in which one of ordinary skill in the art could combine the Pohl and Wells teachings to arrive at the device claimed in claim 1. Therefore, applicant submits that claims 6-7 are patentable for the same reasons given above in relation to claim 1.

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Claims 8-11 stand rejected under 35 U.S.C. § 103(a) over Pohl in view of Tackett (U.S. Patent No. 4,118,637). Tackett was relied upon in the rejection for a teaching of a braking system. However, there is nothing in Tackett to teach or suggest the claimed combination of two lift-based vertical axis wind turbines wherein aerodynamic interaction between said wind turbines increases the efficiency thereof. It would not have been obvious to one of ordinary skill in the art to have combined the teachings of Pohl and Tackett to arrive at a wind turbine as claimed in claim 1. Therefore, applicant submits that claims 8-11 are patentable for the same reasons given above in relation to claim 1.

Claim 12 stands rejected under 35 U.S.C. § 103(a) over Pohl in view of Brammeier (U.S. Patent No. 5,495,128). The Brammeier patent teaches a pair of drag-based vertical axis wind turbines that are mounted on a common structure. There is no mention in the Brammeier reference of aerodynamic interaction between the wind turbine rotors to provide increased efficiency. Moreover, Brammeier teaches the use of aerodynamic fairings (elements 21, 23, 25, and 27 in Figures 5, 6, and 7) to increase aerodynamic efficiency in a manner similar to that taught by Pohl. Brammeier discusses the use of aerodynamic fairings to increase efficiency in Column 2, Lines 44-58. Therefore, because neither patent discloses the elements claimed, it would not have been possible to one of ordinary skill in the art to have combined Pohl and Brammeier to arrive at the claimed invention.

New independent claim 15 recites a combination that is not taught or suggested by any of the prior art of record, taken either alone or in combination. Specifically, claim 15 recites a pair of *lift-based* vertical axis wind turbines that are separated from each other by a distance that is less than three times the rotors' radius and which are adapted to provide generally unobstructed

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flow of wind between the wind turbines. The devices taught by Pohl, Bourriaud, and Brammeier all include a pair of vertical axis wind turbines, but there are two important distinctions between these devices and the claimed invention. All three of these references utilize drag-based wind turbines rather than lift-based. Also, all three of these references include aerodynamic fairings that obstruct the flow of wind between the wind turbines. Indeed, the inclusion of aerodynamic fairings is a primary reason why they space a pair of (drag-based) vertical axis wind turbines close to each other. Applicant respectfully submits that the combination recited in Claim 15 is patentable over the prior art of record.

**Conclusion**

In view of the foregoing, Applicant submits that this application is in condition for allowance. Favorable reconsideration and prompt allowance are requested. Attention is directed to the concurrently filed Request for Continued Examination, Request for Extension of Time, and Information Disclosure Statement.

The Examiner is invited to telephone the undersigned to advance prosecution.

Respectfully Submitted,



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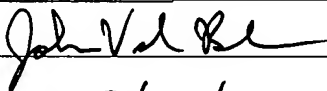
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on February 24, 2004

John VandenBosche



Date of Signature 2/24/04